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In the United States Patent and Trademark Office

In re patent application of: Berndt Cramer and Bernd Schumann

International Application No: PCT/DE 00/04550 filed on
December 20, 2000

Priority Claimed: German patent application 199 62 912.9
filed on December 23, 1999

Title of Invention: Method for Operating a Sensor for
Determining the Concentration of Oxidizing
Gases in Gas Mixtures

Attorney Docket: R 37137

Preliminary Amendment

Honorable Commissioner of
Patent and Trademarks
Washington, D. C. 20231

Dear Sir:

Please amend the above-identified application as delineated
below.

In the Disclosure:

On page 1, between lines 3 and 4, please insert the
following:

-- Field of the Invention --.

On page 1, please delete lines 7 to 9 and substitute the
following therefor:

-- internal combustion engines.

Background of the Invention --.

On page 1, please delete lines 20 to 22 and substitute the

following:

-- Summary of the Invention

The method of the invention offers the advantage that the measuring --.

On page 1, please delete lines 28 to 30 and substitute the following therefor:

-- adjust the voltages on the electrodes without voltages on the electrodes being made incorrect by erroneous voltage drops on the electrode feed lines. This is made possible by --.

On page 2, please delete line 28 and substitute the following therefor:

-- Brief Description of the Drawing --.

On page 3, please delete line 14 and substitute the following therefor:

-- Description of the Preferred Embodiments of the Invention --.

On page 7, please delete line 5 and substitute the following therefor:

-- line resistances. It is --.

In the Abstract:

On page 10, please delete line 1 and substitute therefor:

-- Abstract of the Disclosure --.

On page 10, please delete line 25.

In the Claims:

Please cancel claims 1 to 3 and add claims 4 to 6 as follows:

4. A method for operating a sensor for determining the concentration of oxidizing gases in gas mixtures including the nitrogen oxide concentration in exhaust gases of an internal combustion engine, the sensor including: a first chamber disposed in a solid state electrolyte, the chamber being connected to the gas mixture via a first diffusion barrier; a second chamber arranged in the solid state electrolyte and said second chamber having a pregivable constant oxygen partial pressure; an oxygen pump electrode subjected to the exhaust gas on the solid state electrolyte; a further oxygen pump electrode and an NO pump electrode in said first chamber; and, an oxygen reference electrode arranged in said second chamber; the method comprising the steps of:

applying a voltage to the electrodes and evaluating a pump current as a measurement signal;

changing the voltages (U_IPE; U_O2; U_NO), which are applied to the electrodes, in dependence upon the currents, which flow in the electrode feed lines and/or between the electrodes, during operation of the sensor in such a manner that the voltages correspond to pregivable desired values; and,

applying said voltages to the electrodes in the interior of

said sensor.

5. The method of claim 4, wherein voltages are added to the voltages applied to the electrodes, these added voltages corresponding to a feedback of voltage components weighted with factors (K1, K2, K3, K4, K5, K6) which voltage components are proportional to the currents, which flow in the electrode feed lines and/or between the electrodes during operation of the sensor and/or are proportional to the sliding mean values of the voltages, which are proportional to the currents and which are formed by means of electric circuit elements and/or the derivatives of higher order and/or their sliding mean values or linear combinations thereof.

6. The method of claim 4, wherein at least one of the factors (K1, K2, K3, K4, K5, K6) is increased so long until an oscillation occurs because of the feedback and that one slightly reduces this factor (K1, K2, K3, K4, K5, K6) by an amount determined experimentally so that just no oscillation occurs anymore.

Remarks

Claims 4 to 6 have been added and claims 1 to 3 are cancelled so that claims 4 to 6 are pending in this application of which only claim 4 is in independent form. The new claims make improvements as to the form of the original claims.

The disclosure has been amended to add appropriate headings and to correct errors in the disclosure.

Respectfully submitted,



Walter Ottesen
Reg. No. 25,544

Walter Ottesen
Patent Attorney
P.O. Box 4026
Gaithersburg, Maryland 20885-4026

Phone: (301) 869-8950

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